VI. MOLLUSCA

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THE mollusca are represented by 2 Loricates, 27 Gastropods, 13 Lamellibranchs, 4 Cephalopods, and a few Nudibranchs not reported on here. As this particular area has been thoroughly worked for mollusca by numerous workers, notably McAndrew and Issel, it is not surprising that no new forms were found. The Gastropoda and Lamellibranchia call for no special description and have been listed with notes on distribution. Although the Cephalopoda are all well-known species, they are so well preserved that we have noted features of interest, standard measurements, and included photographs.

Callistochiton heterodon var. *savignyi* appears to be rare and is only known from the northern part of the Red Sea; it was not hitherto represented in the collections of the British Museum. Other species which appear to be confined to the Red Sea are *Clanculus pharaonis*, *Trochus erythraeus*, and *Lithophaga hanleyana*. All the remaining species are found either in the western part of the Indian Ocean or have a wide distribution in the Indo-Pacific. In the Cypraeidae Schilder (1938) has drawn attention to races of well-known species which are becoming differentiated in various areas, including the Red Sea.

The classification of Indian Ocean Lamellibranchs, and indeed all Lamellibranchs, is in a very unsatisfactory state, and in the specific names we have adopted we have followed Thiele (1929–1934), Tomlin (1927), Smith (1897), and various papers by E. Lamy. Recent work on molluscs has shown that species seemingly identical, or appearing to have only minor points of difference, have distinct larvae and life histories, revealing that they are distinct. Elaborate lists of synonyms may therefore prove erroneous, and usually we have confined ourselves to referring the specimens to species with which they appear to be identical.

Among the Cephalopods *Octopus macropus* is common in the Red Sea and in the Mediterranean. The remainder, *O. horridus* Orbigny, *O. cyanea* Gray, and *Sepioteuthis lessoniana* Lesson, are at the western limit of their range, which extends to the Andaman Islands in *O. horridus* and throughout the tropical Indo-Pacific in the other species.

The Cephalopods of the Red Sea have been reviewed by Adam (1942) and a study of his list reveals that they are all either littoral and shallow water forms or have planktonic larvae which live close to the surface during their early life.[1] As examples of the former we have species of *Octopus*, *Sepia*, *Sepioteuthis*, and *Doryteuthis*, and of the latter (oceanic species) we have *Symplectoteuthis*, *Tremoctopus*, and *Argonauta*. Cephalopods characteristic of deep water, and even the Cranchiidae (pelagic species which spend much of their early life in the upper 500 metres), are absent.

It has been pointed out by Thompson (1939) that there is a shallow sill near

[1] We have excluded *Spirula spirula* (L.), the shells of which are recorded from the Red Sea. It is probable that these have their origin outside the area.

Hanish Islands separating the Red Sea 'proper' from the Gulf of Aden. At about latitude 13° 41′ N. the depth of the sill is only 100 metres, and this may act as a geographical barrier to deep-water species. This is probably one reason why bathypelagic forms are absent in the Red Sea, but it does not explain the absence of Cranchiidae, which as larvae often occur right up to the surface. The normal interchange of water over the sill (see Thompson) should carry the larvae into the Red Sea and another explanation is required. There are some grounds for believing that these forms are the young of little known bathypelagic species and they may not be tolerant to high salinities of 38‰ to 40‰ such as are typical of the Red Sea.

The following species are known only from the Red Sea; those marked by an asterisk are insufficiently known and may prove to belong to other species:

Sepia savignyi Blainville, 1827
**Sepia gibba* Ehrenberg, 1831
**Sepia elongata* Férussac & d'Orbigny, 1835–1848
**Sepia trygonina* Rochebrune, 1884
Doryteuthis arabica Ehrenberg, 1831
**Abralia steindachneri* Weindl, 1912
Octopus robsoni Adam, 1941
Sepia dollfusi Adam, 1941

Four of the above are imperfectly known, and of the seventeen species recorded from the Red Sea, only four sound species can be regarded as endemic. It is possible that even this number may be further reduced when the cephalopod fauna of the western Indian Ocean becomes better known.

Class LORICATA

Family CRYTOPLACIDAE

Callistochiton heterodon var. ***savignyi*** Pilsbry

Locality: 30.i.49, Mualla, 1 specimen.

This small Callistochiton was taken with two specimens of *Acanthopleura haddoni*. It has a total length of 13 mm. and a breadth of 7·5 mm.

This variety was named by Pilsbry (1892) from a figure given by Savigny (*Egypte*, pl. 3, fig. 8). Our specimen has the following characters. Shell oval, distinctly ridged along the median line; the sides of the valves are only slightly curved. Valves greyish white with occasional irregular darker markings. Girdle buff-coloured with faint slate-grey vertical bands. Head valve, with 10 slightly denticulate ribs, 2 of these bifurcate anteriorly. Tail valve, distinctly narrower than head valve, with 11 radiating rays. Other valves with distinct but not backward projecting beaks. Lateral areas raised with 2 denticulate ribs. Central areas with 7–8 narrow deeply etched riblets on each side with a central smooth tract between them.

This variety has affinities with *C. adenensis* Smith, but differs from it mainly in having only 10–11 radiating ribs on the anterior valve instead of 22 as in Smith's species. *C. heterodon* var. *savignyi* is only known from this northern part of the Red Sea.

Family CHITONIDAE

Acanthopleura haddoni Winckworth

Acanthopleura sp. Haddon, 1886: 24.
Chiton (*Acanthochites*) *spiniger* Issel, 1819: 235 [non Sowerby].
Acanthopleura spinigera, Sykes, 1907: 34; Tomlin, 1927: 292 [non Sowerby].
Acanthopleura haddoni Winckworth, 1927: 206.

Localities: 29.xii.48, Aqaba, just below low tide mark, 4 adults. 8.i.49, Sanafir, 2 adults. 30.i.49, Mualla, attached or under stones at low tide, 2 adults. 9.ii.49, Sanafir, among rocks along the shore, 1 adult.

This large and decorative chiton is known from the Suez area of the Red Sea under the name *spinigera*. The earliest record is that of Savigny (*Egypte*, pl. 3, fig. 4). Winckworth (1927) distinguishes the species from *A. spinigera* Sowerby, an Australian and Indonesian species, and described specimens from Aden under the name *A. haddoni*. According to Winckworth the living animal reaches a length of 3 in. and our largest specimen is of this size, although it cannot be measured accurately because of contraction of the foot causing the animal to be bent in the form of a crescent. In all our examples the girdle is irregularly marked with black and olive bands. In the living animal the foot is of a salmon-pink colour.

It is impossible at present to give an accurate picture of the distribution of this mollusc. We know it occurs in the Red Sea (at Aden, Suez, and the localities given above), but its occurrence outside this area becomes confused with that of *A. spinigera* (Sowerby). Cyril Crossland (quoted by Sykes) notes that it is 'the common high tide chiton, everywhere in E. Africa, on the cliffs of coral-rag at Djibouti, Mombasa, Zanzibar, Wasin etc.; also on stone on the edge of reefs of the East Coast of Zanzibar'.

Class CEPHALOPODA

Family LOLIGINIDAE

Sepioteuthis lessoniana Lesson (Plate 28, figs. 1 and 2; Plate 29, figs. 5 and 6)

31.xii.48, Station A1, dip net, surface, Faraun Island, 1♀(3). 28.i.49, Aqaba, 1♀(1). 4.ii.49, Sanafir, cast net, surface, 1♂(2).

The two specimens are remarkably well preserved, and the ground colour in formalin is flesh-coloured. The reddish-purple chromatophores are fairly evenly distributed over the ventral surface of the head, arms, funnel, and mantle, with denser patches around the edge of the eye. There are no chromatophores on the ventral surface of the fins; the muscle-fibres of the fins are prominent.

On the dorsal surface, the chromatophores are more densely crowded, especially just above the eye, and on the dorsal mantle.

In the male (less prominent in the female) there are irregular ivory-coloured patches which are covered by one or more large chromatophores. When the skin of the mantle is folded back to expose the pen, these white patches are seen to lie over patches of bright emerald-green, which presumably cause the animal to be iridescent. The secondary sexual character of the male (transverse whitish streaks across the dorsal mantle), which has been noted by Adam (1938), is distinct in the

large male from Sanafir (No. 2). Colour notes on the living animal state that the dorsal mantle was of a reddish-brown colour with iridescent green spots on the mantle itself, but not on the fins. The animals appear to fall within the limits given by Adam (1939) in his review of *Sepioteuthis lessoniana*. Adam, and indeed most other workers, have given figures of medium-sized individuals of about 150 mm. in dorsal mantle length. In these the maximum fin width is found in the posterior third of the body, but in our specimens, which are much larger, the maximum fin width occurs about midway between the apex and the mantle margin. This is to be expected in the larger animals because growth proceeds at a much faster rate in the posterior third of the body. As far as can be judged from Adam's illustrations of *S hemprichii* Ehrenberg 1831 our specimens agree in form of the body and in the fins. There appears to be no doubt that Ehrenberg's specimens were really large individuals of *S. lessoniana* like these from the Gulf of Aqaba. The hectocotylized arm (left ventral arm) is particularly well developed and of the usual pattern in *Sepioteuthis*. There are 34 pairs of suckers which gradually diminish in size distally, with a proportionate increase in size of their peduncles. The distal portion of the arm is occupied by 25 pairs of triangular flattened papillae. As noted by Adam (1939) the papillae on the dorsal side are more strongly developed than those on the ventral side.

In the female specimen spermatophores have been deposited on the ventral side of the buccal membrane.

TABLE I

Sepioteuthis lessoniana Lesson

(Measurements in mm.)

	(1) ♀	(2) ♂	(3) ♀
Dorsal mantle length	280	270	136
Ventral mantle length	260	235	127
Greatest mantle length	65	80	35
Greatest mantle thickness	60	63	34
Length of head	39	61	31
Width of head	64	71	36
Thickness of head	45	46	23
Length of fin	258	246	124
Distance between fin base and mantle margin	5	6	6
Arms			
1st right	72	87	30
1st left	69	80	28
2nd right	102	111	47
2nd left	39 (broken)	105	51
3rd right	128	131	58
3rd left	64 (broken)	122	60
4th right	122	136	62
4th left	66 (broken)	134	62
Length, right tentacle	197	214	95
Length, left tentacle	71 (broken)	244	92
Right tentacular club	110	101	40
Left tentacular club	(missing)	116	42
Diameter largest arm sucker	5	5	2·5
Diameter largest tentacular sucker	7	8	4

Sepioteuthis sp. (Plate 29, figs. 3 and 4)

1.ii.49, Sherm Sheik, surface, 1 juvenile. 11.i.49, Sherm Sheik, 1 newly hatched.

The young post-larval squid compares very favourably with one illustrated by Wülker (1913, pl. 22, fig. 2*g*). In our specimen the chromatophores are more numerous than in Wülker's slightly younger specimen. Full measurements of this specimen are given in Table II. We are not able to assign this to any particular species of *Sepioteuthis*, but if we may judge by the extent to which the fins are developed there is every likelihood that it is a young individual of *Sepioteuthis lessoniana* Lesson.

The newly hatched larva has a dorsal mantle length of only 4·5 mm. and is a little damaged. It compares very favourably with a stage illustrated by Wülker in his figure 2*g*.

TABLE II

Sepioteuthis sp.

(Measurements in mm.)

Dorsal mantle length	19
Ventral mantle length	17
Greatest mantle breadth	7
Greatest mantle thickness	6·5
Length of head	7
Width of head	7
Thickness of head	6
Length of fin	12
Distance between fin base and mantle margin	5

Arms	*Right*	*Left*
1st	3·5	3·5
2nd	7	7
3rd	10	10
4th	8	8

Length, right tentacle	16
Length, left tentacle	16
Right tentacular club	7·5
Left tentacular club	7·5
Diameter of largest arm sucker	0·35
Diameter of largest tentacular sucker	0·4

Octopus horridus d'Orbigny (Plate 29, fig. 7)

Octopus horridus d'Orbigny, 1826: 144.
Octopus argus Krauss, 1848: 132.
Polypus aculeatus Hoyle, 1904: 194 [non d'Orbigny 1840].
Octopus (*Octopus*) *horridus*, Robson, 1929: 91.

10.i.49, Tiran, found in coral, 1 ♂.

This littoral octopus is well known from the Suez area of the Red Sea. It has been previously taken in the crevices of coral by Hoyle (1907).

Our specimen agrees in most particulars with earlier descriptions, but a few features are worthy of comment. The dorsal surface of the mantle, head, and arms is ornamental with pale olive-green patches; most of these have a distinct cirrus in the

centre. The spaces in between the paler patches are filled by closely grouped chromatophores, which appear black or very dark red in formalin. There is no ocellus. The ventral surface of the mantle is of a pale cream colour. Colour notes on the living animal state that when found the *Octopus* was yellowish with a green network on the arms. The ground colour changed to brown when the animal was placed on a dark background.

The ground colour of the inner surface of the tentacles is also pale cream with light brown chromatophores evenly distributed over it.

The body is ovoid, the eyes prominent, and the arms long in proportion to the length of the body (the arms are too tightly coiled for accurate measurements, but the formula is of the order 4.3.2.1). The ventral arms are more robust than the others, the first pair being the least well developed. As noted by Robson (1929) the hectocotylized arm is shorter than its fellow. The spermatophore groove on the ventral side is prominent, and is protected especially near its tip by a membraneous extension of the arm.

The standard measurements are given in Table III.

Distribution. This species has been recorded by a number of workers, from the Red Sea, and especially from the Suez Canal zone (see Robson, 1929). Beyond the Red Sea it has been recorded from Ceylon, and other parts of the central Indian Ocean by Hoyle (1904, 1905, 1907*a* and *b*). Other records from the same area are given by Robson (1929: 91). There are no records of this species east of the Andaman Islands.

TABLE III

Octopus horridus d'Orbigny

(Measurements in mm.)

Sex	♂
Total length (including 3rd arm)	65+
Dorsal mantle length	15
Width of body	12
Width of head	11
Arm formula	4.3.2.1
Web formula	$D > C = E > B > A$
Diameter of largest sucker	2·25
Length of ligula	2·55
Indices	
Mantle width index	**80**
Head width index	**13·5**
Sucker index (normal)	**15**

Octopus macropus Risso

11.ii.49, Abu Zabad, on reef at low tide, 1 ♀. 31.xii.48, Station A1, Faraun Island, surface, imm. ♂.

This well-known octopus needs no further description, but standard measurements are provided for comparison with those which already exist for the Caribbean population of this species (Table IV). The measurements indicate that the Red Sea specimens fall within the limits already known for the species.

Distribution. The species occurs in the Caribbean, the NE. Atlantic, the Mediterranean, the Red Sea, and the Indo-Pacific to Japan and Australia. Its eastern limit appears to be the Marshall Islands. It has been recorded from the Red Sea by Wülker (1920) and Weindl (1912), to mention only two records.

Table IV

Octopus macropus Risso

(Measurements in mm.)

Sex	♀		juvenile ♂	
Total length (including 3rd arm)	246		40	
Dorsal mantle length	58		16	
Eye to dorsal web	47		6	
Width of body	36	36	10	
Width of head	—	29	7	
Arms	*Right*	*Left*	*Right*	*Left*
1st	246	245	34	34
2nd	228	227	28	26
3rd	208	177	23	22
4th	186	190	20	20
Diameter of largest sucker	—	6	0·75	—
No. of gill filaments		—	11	
Web formula	$B > A > C > D > E$		$B > C = A = D > E$	
Indices				
Mantle width index	**62**		**62·5**	
Head width index	**50**		**44**	
Sucker index (normal)	**10·5**		**4·7**	
Arm length index	**78·5**		**68**	

Table V

Octopus cyanea Gray

	I	*II*	
Sex	♀	♀	
Total length (including longest arm)	420	343	
Dorsal mantle length	52	55	
Eye to dorsal web	—	44	
Width of body	46	38	
Width of head	40	35	
Arms		*Right*	*Left*
1st	—	265	205*
2nd	—†	280	190
3rd	—	200*	260‡
4th	—	190‡	210‡
Diameter of ocellus	8	5	
Diameter of largest sucker	6	5	
No. of gill filaments	7–8	9	
Web formula	—	$D = C > B > A = E$	
Arm formula	—	2.1.3.4 or 1.2.3.4	
Web depth	—	47	

* Arm incomplete, tip portion missing. † Arms too tightly coiled for accurate measurements.
‡ Regenerating.

Indices

Mantle with index	88·5	69
Head width index	77	63·5
Sucker index (normal)	11·5	9·1
Arm length index	82	81·5
Web depth index	—	16·8

Octopus cyanea Gray (Plate 30)

Octopus cyanea Gray, 1849: 15.
Octopus marmoratus Hoyle, 1886: 227.
Octopus horsti Joubin, 1898: 23.
Polypus fontanianus Robson, 1920: 437.
Polypus horsti, Wülker, 1920: 51.

6.i.49, Sanafir, along shore, 1 ♀. 12.i.49, Sherm Sheik, in shallow water along shore, 1 ♀.

We have referred these two specimens to *Octopus cyanea* Gray, but as they present a different appearance to what is usually associated with *O. cyanea*, the various features worthy of note are discussed below. Typical specimens, of which we have seen a number in the collections of the British Museum, are, as Robson says, 'mainly of a warm ochreous red suffused and maculated with purple, which may be very deep so as to render the animal homogeneously blackish or deep livid (in preservative)'. Our specimens, however, are of a buff or pale brownish colour, with an olive-green sheen, which is especially marked on the dorsal surface of the web and the base of the tentacles. The top of the head, between the eyes, is a deeper brown colour. The specimens are paler ventrally and the ventral side of the arms have the characteristic zebra-like marking which Robson regards as one of the most striking and constantly associated features of *cyanea* as a species. Colour notes made from the living animal state that the colour of the specimen taken on 12.i.49 was brown and that the zebra-like markings on the arms were of a light blue colour.

The dark purple ocellus is well marked and surrounded by an ill-defined pale ring, as mentioned by Robson for his British Museum specimens (Nos. 4 and 8).

Specimen No. I is rather contracted; the skin of the mantle is reticulated and has a number of scattered irregularly arranged cirri, which are more numerous between the eyes and on the fore part of the head. Specimen No. II is less contracted, and has four cirri arranged in a diamond pattern on the dorsal mantle and four to five prominent cirri on the fore part of the head. The ventro-lateral and anterior portion of the mantle carries a number of scattered cirri. There is also a curious fold of skin, on either side of the neck region postero-ventral to the eye, which effectively separates the ventral funnel region from the lateral face of the head.

The dorso-lateral surface of the arms in both specimens have a double row of slightly raised, buff-coloured, simple papillae which have not been mentioned by any other writer. A re-examination of Gray's type of *O. cyanea* and other specimens reveals the presence of these papillae, but they are more difficult to see than in our specimens, because they are obscured by the dark, ground colour normal in this species.

The number of gill filaments in the demi-branchs, normally a good diagnostic feature in octopods, appears to be rather variable in the species (7–9 in our specimens). Robson gives 9–10 for Gray's type of *O. cyanea*, and we have found that even in the same specimen one gill may have 7 filaments and the other 9 filaments per demi-branch (1 ♀ from the Cocos-Keeling Islands).

Standard measurements are given in Table V, but it has not been possible to give measurements of the arms in specimen I because they are too tightly coiled.

The only other ocellate species recorded from this area is *Octopus robsoni* Adam, 1941, of which a complete description has not yet been published. Adam states that this octopod 'se caractérise à première vue par la présence d'une paire d'ocelles pourvue d'un anneau irisé blanchâtre, bleuâtre ou mauve'. We have mentioned this species because our specimens approach nearer to it in colour and the arrangement of the cirri than to the typical form usually found in *O. cyanea*. However, the character of the ocellus, without an iridescent ring, the zebra-like markings on the ventral surface of the arms, and the various indices which fall within the limits of *O. cyanea*, leaves us in no doubt as to the identity of our species.

Distribution. Octopus cyanea is a littoral species well known as a reef-inhabiting octopod, with a distribution ranging through the Indo-Pacific in tropical and subtropical waters from Hawaii to the Red Sea.

Previous records from the Red Sea are given by Robson (1929) and Wülker (1920).

Class GASTROPODA

Family Haliotidae

Haliotis varia L.

31.xii.48, station A1, shore of Faraun Island, 3 specimens. 20.i.49, Dahab, on mud flats at low tide, 1 specimen. 5.ii.49, Sanafir, found on coral, 1 specimen. 11.ii.49, Abu Zabad, on reef at low tide, 4 specimens. 15.ii.49, Sherm Sheik, under rocks at low tide, 1 specimen and 1 juvenile. Dahab, found on coral, 1 specimen.

Issel (1869) collected two specimens of *H. varia* from the Gulf of Suez. From the numbers obtained in our collection it appears to be fairly common in the Gulf of Aqaba. According to Pilsbry (1890) it has a wide distribution in the Indo-Pacific, being found in the following places: Australia and Philippines to China; Mozambique, Red Sea, Island of Bourbon, Mauritius, Ceylon, Nicobar Islands, Malay Archipelago.

Family Fissurellidae

Diodora ruppellii (Sowerby)

Fissurella ruppellii Sowerby, 1838: 128.
Fissurella costaria Vaillant, 1865: 109.
Fissurella vaillanti Fischer, 1865: 244.
Glyphis ruppellii, Pilsbry, 1890: 217, pl. 39, fig. 8.
Diodora ruppellii, Tomlin, 1927: 289.

15.ii.49, Sherm Sheik, under rock at low tide, 1 specimen.

Distribution. This molluscs seems to be common almost throughout the Suez

Canal according to Tillier & Bavay. It has frequently been reported at Suez (see Tomlin, 1927, for previous records). *D. ruppellii* is found in the Western Indian Ocean, in the Red Sea, at Aden, Mauritius, and on the East African coast.

Family Patellidae

Cellana rota (Gmelin)

Patella rota, Issel, 1869: 233.
Patella rota, McAndrew, 1870: 444.
Patella variegata Reeve, 1842, pl. 136, fig. 1.
Cellana rota, Tomlin, 1927: 299.

12.i.49, Sherm Sheik, 6 specimens. 20.i.49, Dahab, on mud flats at low tide, 2 specimens.

Both McAndrew and Issel record this species as common; the former from the Gulf of Suez and the latter from the Gulf of Aqaba. Tomlin (1927) found it in the Suez Canal zone.

Distribution. Red Sea, east coast of Africa, Réunion, and Madagascar.

Family Trochidae

Clanculus pharaonis (L.)

30.i.49, Mualla, among rocks and coral at low tide, 1 specimen.

This is one of the most characteristic molluscs of the Red Sea area; it occurs from Suez to Aden, and was reported by Issel (1869) to be especially common in the Gulf of Aqaba. Tomlin (1927) gives previous records for the Suez area and records it from the Canal.

Trochus (Infundibulops) erythraeus Brocchi

20.i.49, Dahab, on mud flats at low tide, 1 specimen. 2.ii.49, Sherm Sheik, associated with coral, 2 fms., 1 specimen.

T. erythraeus has been collected from the Gulf of Aqaba by Issel (1869). Tomlin (1927) recorded it from the Gulf of Suez, and various other collectors, e.g. McAndrew (1870) and Vaillant (1865), have recorded it from the Red Sea area.

Trochus dentatus Forskål

30.i.49, Mualla, among rocks and coral at low tide, 2 specimens. 2.ii.49, Sherm Sheik, associated with coral, 1 young specimen.

T. dentatus is one of the common molluscs of the Red Sea and Persian Gulf. It has been recorded from the Gulf of Suez by McAndrew, Issel, and Vaillant. Tomlin (1927) reports it from the Suez Canal zone, and Issel (1869) states that it is abundant in the Gulf of Aqaba.

Family Turbinidae

Turbo radiatus Gmelin

6.ii.49, Sanafir, found in coral, 1 specimen. 11.ii.49, Abu Zabad, on reef at low tide, 2 specimens.

T. radiatus is a common Indo-Pacific form, which is found in the Red Sea, the East African coast, and eastwards as far as the Philippines and New Caledonia. Tillier & Bavay (1905) and Tomlin (1927) record it from the Gulf of Suez and the Suez Canal zone.

Family Neritidae

Nerita forskalii Recluz

6.i.49, Sanafir, along shore of anchorage, 3 specimens. 12.i.49, Sherm Sheik, 7 specimens. 30.i.49, Mualla, found at low tide among rocks and coral, 2 specimens.

This extremely variable mollusc has been recorded from the Gulf of Aqaba by Tomlin (1927) and Issel (1869). It is a common Indo-Pacific form, Tryon (1888) giving its distribution as the Red Sea, Indian Ocean, Natal, Singapore, China, the Philippines, and Viti Islands.

Nerita undata var. ***quadricolor*** Gmelin

12.i.49, Sherm Sheik, 1 specimen.

N. undata is a widely distributed species in the Indo-Pacific. In the variety *quadricolor* the aperture of the shell is white and the ribs are maculated with purplish black. This variety is confined to the western part of the Indian Ocean.

Family Planaxidae

Planaxis breviculus Deshayes

6.i.49, Sanafir, along shore of anchorage, 3 specimens.

This species has been reported from the Gulf of Suez by McAndrew (1870), who records it as a common species at low water. Smith (1891) reports it from Aden and refers to specimens in the British Museum from the Gulf of Aqaba and Persian Gulf. According to Tryon (1887) *P. breviculus* is a variety of *P. sulcatus*. Both forms have a wide distribution in the Indo-Pacific. Until more is known about the life-history of these periwinkles, we prefer to retain the name *P. breviculus*.

Family Cerithiidae

Cerithium tuberculatum (L.)

6.i.49, Sanafir, shore of anchorage, 2 specimens.

McAndrew found this species moderately common in the Gulf of Suez. It is an extremely variable species, and has been reported on numerous occasions from the Red Sea.

Distribution. Widespread in the Indo-Pacific (Smith, 1903).

Family MELANELLIDAE

***Melanella* sp.**

10.i.49, Tiran, 1 specimen.

We do not feel justified in giving this specimen a name in view of the confusion which exists in the classification of the genus.

Family STROMBIDAE

***Pterocera lambis* (L.)**

5.ii.49, Sanafir, in coral, 1 specimen.

This large shell was previously recorded from the Gulf of Aqaba by Issel (1869). *Distribution.* Widespread in the Indo-Pacific.

Family NATICIDAE

***Natica mamilla* L.**

N. mamilla, Lamarck, 1838: 630.

6.i.49, Sanafir, along shore of anchorage under rocks, 1 specimen.

N. mamilla has been previously recorded from the Gulf of Aqaba by Issel (1869). Tryon (1886) gives the distribution as the East Indies, the Philippines, New Caledonia, and central Polynesia.

Family CYPRAEIDAE

***Cypraea caurica* (L.)**

20.i.49, Dahab, on mud flats at low tide, 1 young specimen.

Schilder (1938) recognizes seven races of this species, which has a widespread distribution in the Indo-Pacific.

***Cypraea arabica* L.**

30.i.49, Mualla, among rocks and coral at low tide, 1 specimen. 5.ii.49, Sanafir, found in coral, 1 juvenile specimen. 11.ii.49, Abu Zabad, on reef at low tide, 1 specimen. 11.ii.49, Abu Zabad, on reef at low tide, 4 juvenile specimens.

C. arabica is a well-known Indo-Pacific species, often recorded by workers on Red Sea fauna. Savigny (*Egypte*) gives a figure, and the species is recorded from the Gulf of Aqaba by Issel (1869). Schilder (1938) recognizes six races in the Indo-Pacific; our specimens conform to the E. African and Red Sea form which Schilder calls *immanis*.

***Cypraea isabella* L.**

Turia (*Basilitrona*) *isabella*, Schilder, 1938: 176.

3.ii.49, Sherm-el-Moiya, associated with coral, 1 specimen. 6.ii.49, Sanafir, associated with coral, 1 specimen.

C. isabella, of which four races are recognized by Schilder, has a widespread distribution in the Indo-Pacific. Our specimens belong to the typical form which is confined to the Western Indian Ocean and the Red Sea.

Cypraea carneola L.

Cypraea (*Lyncina*) *carneola*, Schilder, 1938: 188.

11.ii.49, Abu Zabad, on reef at low tide, 3 specimens. 11.ii.49, Abu Zabad, on reef at low tide, 2 juvenile specimens.

This species is widely distributed in the Indian Ocean and also in the Pacific as far as Hawaii. Schilder recognizes four races of this species. The Red Sea form *crassa* is also found in the Gulf of Aden, Persian Gulf, and Karachi.

Cypraea erosa L.

Erosaria (*Erosaria*) *erosa*, Schilder, 1938: 137.

30.i.49, Mualla, among coral at low tide, 1 specimen.

This species has been recorded from the Gulf of Aqaba by Issel (1869). *C. erosa* has a wide distribution in the Indian Ocean and in the Western Pacific. Our specimen belongs to the typical form. Schilder (1938: 137) recognizes six races in the Indo-Pacific.

Cypraea tigris L.

Cypraea (*Cypraea*) *tigris*, Schilder, 1938: 186.

11.ii.49, Abu Zabad, on reef at low tide, 1 immature specimen.

Issel (1869) reports this species to be abundant in the Gulf of Aqaba. It has previously been reported from the Red Sea by many writers, including Ehrenberg (1831). Our specimen is not fully grown and we are unable to determine whether it belongs to the typical form. *Cypraea tigris* (*sensu lata*) is widely distributed in the Indian Ocean and in the Pacific.

Family Cymatiidae

Cymatium rubeculum (L.)

Tritonium (*Simpulum*) *rubeculum*, McAndrew, 1870: 434.
Triton (*Simpulum*) *rubecula*, Tryon, 1881: 12.

1.ii.49, Sherm Sheik, associated with coral, 2 specimens.

McAndrew took 2 specimens at Jubal Island in the Gulf of Suez.
Distribution. Red Sea to the Philippines.

Distortrix anus (L.)

Triton anus, Reeve II, *Triton*, pl. xii, fig. 63.

Abu Zabad, on reef at low tide, 1 specimen.

This species has been previously recorded from the Gulf of Aqaba by Issel (1869).

Family Muricidae

Drupa (Drupa) ricinus (L.)

30.i.49, Mualla, among rocks and coral at low tide, 4 specimens. 11.ii.49, Abu Zabad, on reef at low tide, 1 specimen.

Distribution. Red Sea, east coast of Africa, to Natal, Philippines, and Polynesia (Tryon, 1880: 184).

Drupa (Drupa) elata (Blainville)

2.ii.49, Sherm Sheik, 2 fms., associated with coral, 3 specimens.

This well-known inhabitant of coral reefs has a wide distribution in the Indo-Pacific. It is recorded from Aden by Smith (1891).

Family Buccinidae

Pisania ignea Gmelin

2.ii.49, Sherm Sheik, 2 fms., 1 specimen. 5.ii.49, Sanafir, found in coral, 1 specimen.

Distribution. Red Sea, Singapore, and Philippines.

Family Conidae

Conus rattus Lamarck

Conus rattus, Smith, 1891: 399.
Conus rattus, Dautzenberg, 1937.

Conus rattus is a very variable species and has been recorded by many authorities including Smith (1891) and Dautzenberg (1937). Its distribution is very widespread in the Indo-Pacific.

Conus textile L.

11.ii.49, Abu Zabad, on reef at low tide, 1 specimen.

This poisonous cone shell is widely distributed in the Indo-Pacific and has been recorded from the Gulf of Aqaba by Sturany. Dautzenberg (1937) gives a very long list of localities for the species.

Family Nassidae

Nassa pulla L.

20.i.49, Dahab, collected on mud flats at low tide, 5 specimens.

Issel (1869) records this shell from the Red Sea area. Tryon (1882) gives its distribution as the Red Sea, Java, and the Philippines.

Class *LAMELLIBRANCHIA*

Family Arcidae

Arca divaricata Sowerby

Arca divaricata, Tomlin, 1927: 304.

2.ii.49, Sherm Sheik, associated with coral, 2 fms., 2 specimens. 15.ii.49, Sherm Sheik, under rocks at low tide, 3 specimens.

It has previously been recorded by Tomlin from the Suez Canal and by McAndrew from the Gulf of Suez, under the name *A. plicata*. *A. divaricata* has a wide distribution in the Indian and Pacific Oceans.

Arca (Barbatia) decussata Sowerby

31.xii.48, station A1, shore of Faraun Island, 1 specimen. 31.xii.48, station A1, shore of Faraun Island, 2 specimens. 20.i.49, Dahab, mud flats at low tide, 4 specimens. 30.i.49, Mualla, among rocks and coral at low tide, 1 specimen. 9.ii.49, Sanafir, among rocks on shore, 1 specimen.

This species is known from the following places, according to Lamy (1917), Djibouti, Obock, Perim, and Aden. It is expected to have a much wider distribution, and we note a specimen in the British Museum collections from the Java Sea (off Batavia).

Family Mytilidae

Brachidontes variabilis (Krauss)

Mytilus variabilis Krauss, 1848: 25.
Mytilus pharaonis Tillier and Bavay, 1905: 177.
Mytilus exustus, Vaillant, 1865: 114.

20.i.49, Dahab, on mud flats at low tide, 1 specimen.

This very common species was first described from Table Bay by Krauss, who drew attention to its similarity to specimens from the Red Sea. The earliest record from the latter locality is that of Savigny (*Egypte*, pl. xi, fig. 5).

Lithophaga hanleyana Reeve

31.i.49, Mualla, associated with coral, 2 specimens.

L. hanleyana has been previously recorded from the Gulf of Aqaba by Sturany (1899), who also recorded it from the Gulf of Suez and the Red Sea generally. It has also been recorded from the Gulf of Suez by Reeve and McAndrew. The Cambridge expedition to the Suez Canal (1924) also took the species in association with coral.

Lithophaga moluccana Hanley

14.ii.49, Dahab, associated with coral, 1 specimen.

We have identified this species with Hanley's species from Malacca. It appears

to differ from *L. hanleyana* (which is already known from the Red Sea) by the more tapering posterior part of the shell.

Distribution. Indian Ocean.

Family VULSELLIDAE

Vulsella vulsella (L.)

V. lingatula, Issel, 1869: 99.
V. mylitina, Issel, 1869: 100.
V. trita Reeve, 1858, pl. 2, fig. 17.

14.ii.49, Dahab, associated with coral, 1 specimen.

Smith (1911), who has reviewed the genus, gives the distribution of this species as widespread in the Indian Ocean and eastwards to Japan, N. Australia, and New Caledonia. From the Red Sea it has been figured by Savigny (*Egypte*, pl. xiv, figs. 1 and 2) Rüppell records it as *mytilina* and Reeve as *trita*, both from the Red Sea.

Family PECTINIDAE

Chlamys luculentus (Reeve)

Pecten luculenta Reeve, 1853, pl. 16, fig. 59.

2.ii.49, Sherm Sheik, 2 fms., associated with coral, 1 specimen.

We have compared this specimen with the holotype of Reeve from NW. Australia and also with some specimens in the British Museum collection from Aden. There are no differences to be noted in our shell.

The known distribution is the Red Sea and Indian Ocean.

Family OSTREIDAE

Ostrea cucullata Born

9.ii.49, Sanafir, among shore rocks, 1 specimen.

O. cucullata is a very variable species and had been recorded from the Gulf of Suez by Vaillant (1865) and by Issel (1869). This oyster is edible and according to Jousseaume, as quoted by Lamy (1925), is an excellent purgative.

Distribution. Very common at many points in the Red Sea, attached to rocks, which are uncovered by the tide. This species is common throughout the Indian Ocean, and in the Pacific as far as Japanese waters (Lamy, 1925).

Family CARDITIDAE

Cardita variegata (Sowerby)

Cardium variegatum Sowerby, 1841: 107.
Cardita subaspersa Lamarck, 1819: 25.
Cardita radula Reeve, 1843: 191.

11.ii.49, Abu Zabad, on reef at low tide, 4 specimens.

C. variegata is widespread in the Indo-Pacific, Red Sea, and Australian waters. Lamy (1916) records it from Suez, Massaouah, Djibouti, and Perim.

Family TRIDACNIDAE

Tridacna noae (Röding)

Tridacnes noae Röding, 1798: 171.
Tridacna elongata Lamarck, 1819: 106.

31.xii.48, shore of Faraun Island, 2 specimens.

This *Tridacna* has been recorded from the Red Sea, from Suez, and the Gulf of Aqaba by Issel (1869) under the name *T. elongata* Lamarck. Savigny gives the earliest figure from this area (*Egypte*, pl. x, fig. 1). It has a wide range in the Indo-Pacific, including Zanzibar, Mauritius, Australia, Solomon Islands, Carolines, Marshall, and Loo Choo Isles (McLean, 1947).

Tridacna squamosa Lamarck

One specimen of this common Indo-Pacific form was collected; the label appears to have been lost.

Distribution. Indian Ocean, Indonesia, Australia, the Philippines, and Japan.

Family VENERIDAE

Circe scripta (L.)

Venus scripta L.

20.i.49, Dahab, mud flats at low tide, 1 specimen.

Sowerby gives the distribution of this as the Red Sea and Australia. According to Issel (1869) it is a rare species at Suez.

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Legends to Plates 28–30

PLATE 28. *SEPIOTEUTHIS LESSONIANA* LESSON

FIG. 1. Ventral view of ♀ caught at the surface off Faraun Island, 31.xii.48.

FIG. 2. Dorsal view of ♂ caught off Sanafir Island, 4.ii.49.

The transverse streaks characteristic of the male and the pale areas overlying the iridescent patches are clearly shown in the photograph.

PLATE 29

FIGS. 3 and 4. *Sepioteuthis* sp.; dorsal and ventral views of a young immature specimen taken off Sherm Sheik, 1.ii.49.

FIG. 5. *Sepioteuthis lessoniana* Lesson; left tentacle club of ♀ shown on Plate 28, fig. 1.

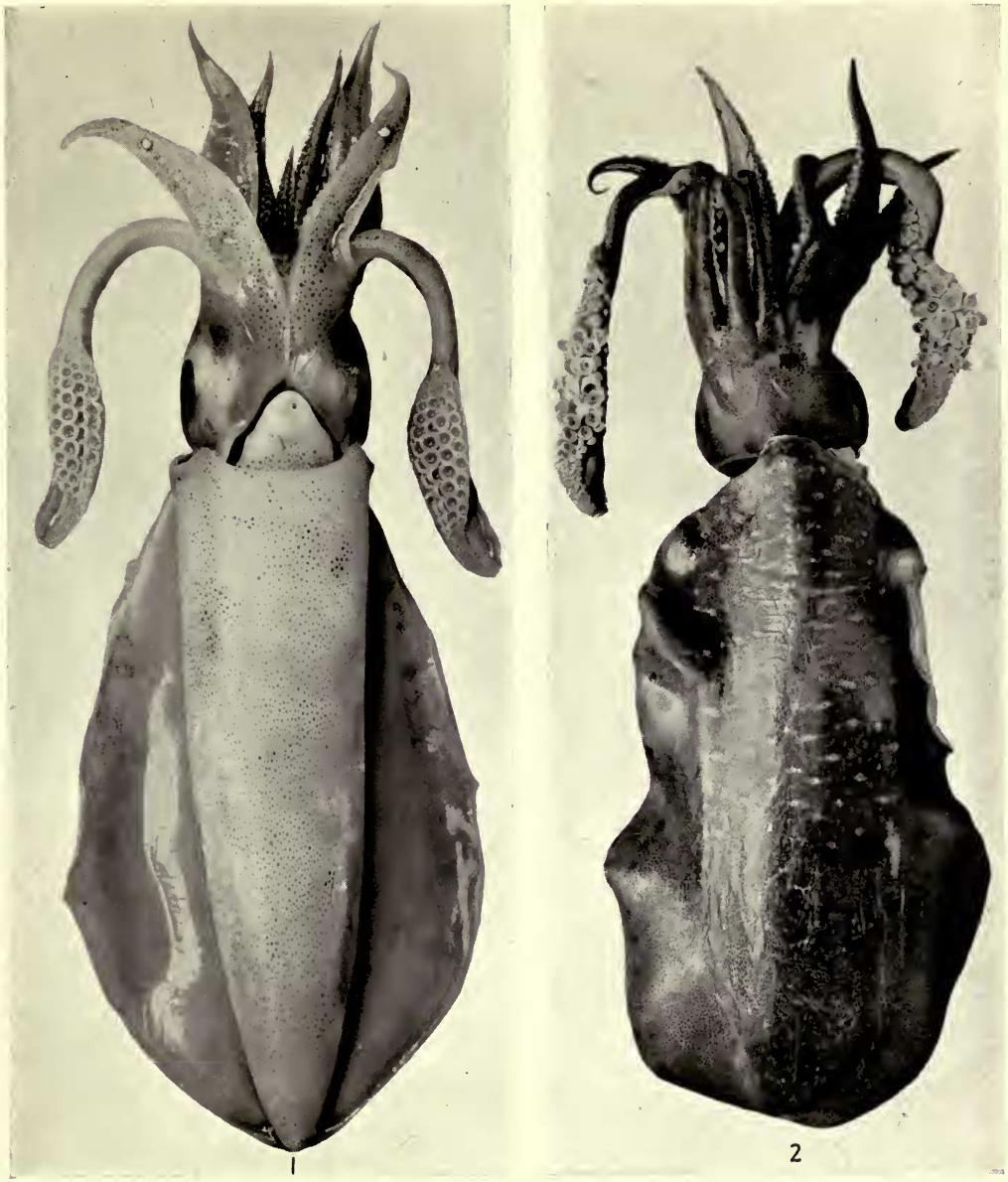
FIG. 6. *Sepioteuthis lessoniana* Lesson; right tentacle club of ♀ taken at Aqaba, 28.i.49.

FIG. 7. *Octopus horridus* Orbigny taken at Tiran Island, 10.i.49.

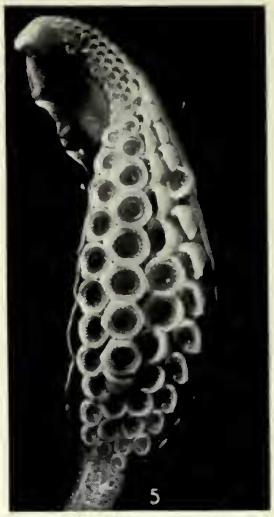
PLATE 30. *OCTOPUS CYANEA* GRAY

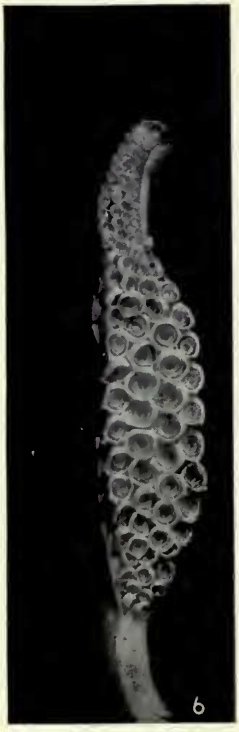
FIG. 8. Lateral view of a ♀ taken at Sherm Sheik, 12.i.49.

FIG. 9. Oral face of the same specimen as in Fig. 8. The so-called 'zebra' markings on the lateral side of the arms are a constant feature in this species.



SEPIOTEUTHIS LESSONIANA LESSON





AQABA CEPHALOPODA

8

9

OCTOPUS CYANEA GRAY